

AP20 Rec'd PCT/PTO 18 MAY 2006

## SEQUENCE LISTING

&lt;110&gt; BASF AKTIENGESELLSCHAFT et al.

<120> METHODS FOR THE PREPARATION OF A  
FINE CHEMICAL BY FERMENTATION

&lt;130&gt; BGI-158PC2

&lt;150&gt; PCT/IB2003/006456

&lt;151&gt; 2003-12-18

&lt;160&gt; 24

&lt;170&gt; FastSEQ for Windows Version 4.0

&lt;210&gt; 1

&lt;211&gt; 1070

&lt;212&gt; DNA

&lt;213&gt; Corynebacterium glutamicum

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (22)... (1029)

&lt;400&gt; 1

gtgccccagg aggccttca g atg aac cta aag aac ccc gaa acg cca gac	51
Met Asn Leu Lys Asn Pro Glu Thr Pro Asp	
1 5 10	
cgt aac ctt gct atg gag ctg gtg cga gtt acg gaa gca gct gca ctg	99
Arg Asn Leu Ala Met Glu Leu Val Arg Val Thr Glu Ala Ala Leu	
15 20 25	
gct tct gga cgt tgg gtt gga cgt ggc atg aag aat gaa ggc gac ggt	147
Ala Ser Gly Arg Trp Val Gly Arg Gly Met Lys Asn Glu Gly Asp Gly	
30 35 40	
gcc gct gtt gac gcc atg cgc cag ctc atc aac tca gtg acc atg aag	195
Ala Ala Val Asp Ala Met Arg Gln Leu Ile Asn Ser Val Thr Met Lys	
45 50 55	
ggc gtc gtt gtt atc ggc gag ggc gaa aaa gac gaa gct cca atg ctg	243
Gly Val Val Val Ile Gly Glu Gly Glu Lys Asp Glu Ala Pro Met Leu	
60 65 70	
tac aac ggc gaa gag gtc gga acc ggc ttt gga cct gag gtt gat atc	291
Tyr Asn Gly Glu Glu Val Gly Thr Gly Phe Gly Pro Glu Val Asp Ile	
75 80 85 90	
gca gtt gac cca gtt gac ggc acc acc ctg atg gct gag ggt cgc ccc	339
Ala Val Asp Pro Val Asp Gly Thr Thr Leu Met Ala Glu Gly Arg Pro	
95 100 105	
aac gca att tcc att ctc gca gct gca gag cgt ggc acc atg tac gat	387
Asn Ala Ile Ser Ile Leu Ala Ala Ala Glu Arg Gly Thr Met Tyr Asp	
110 115 120	
cca tcc tcc gtc ttc tac atg aag aag atc gcc gtg gga cct gag gcc	435

BEST AVAILABLE COPY

```

Pro Ser Ser Val Phe Tyr Met Lys Lys Ile Ala Val Gly Pro Glu Ala
      125      130      135
gca ggc aag atc gac atc gaa gct cca gtt gcc cac aac atc aac gcg 483
Ala Gly Lys Ile Asp Ile Glu Ala Pro Val Ala His Asn Ile Asn Ala
      140      145      150

gtg gca aag tcc aag gga atc aac cct tcc gac gtc acc gtt gtc gtg 531
Val Ala Lys Ser Lys Gly Ile Asn Pro Ser Asp Val Thr Val Val Val
      155      160      165

ctt gac cgt cct cgc cac atc gaa ctg atc gca gac att cgt cgt gca 579
Leu Asp Arg Pro Arg His Ile Glu Leu Ile Ala Asp Ile Arg Arg Ala
      175      180      185

ggc gca aag gtt cgt ctc atc tcc gac ggc gac gtt gca ggt gca gtt 627
Gly Ala Lys Val Arg Leu Ile Ser Asp Gly Asp Val Ala Gly Ala Val
      190      195      200

gca gca gct cag gat tcc aac tcc gtg gac atc atg atg ggc acc ggc 675
Ala Ala Ala Gln Asp Ser Asn Ser Val Asp Ile Met Met Gly Thr Gly
      205      210      215

gga acc cca gaa ggc atc atc act gcg tgc gcc atg aag tgc atg ggt 723
Gly Thr Pro Glu Gly Ile Ile Thr Ala Cys Ala Met Lys Cys Met Gly
      220      225      230

ggc gaa atc cag ggc atc ctg gcc cca atg aac gat ttc gag cgc cag 771
Gly Glu Ile Gln Gly Ile Leu Ala Pro Met Asn Asp Phe Glu Arg Gln
      235      240      245      250

aag gca cac gac gct ggt ctg gtt ctt gat cag gtt ctg cac acc aac 819
Lys Ala His Asp Ala Gly Leu Val Leu Asp Gln Val Leu His Thr Asn
      255      260      265

gat ctg gtg agc tcc gac aac tgc tac ttc gtg gca acc ggt gtg acc 867
Asp Leu Val Ser Ser Asp Asn Cys Tyr Phe Val Ala Thr Gly Val Thr
      270      275      280

aac ggt gac atg ctc cgt ggc gtt tcc tac cgc gca aac ggc gca acc 915
Asn Gly Asp Met Leu Arg Gly Val Ser Tyr Arg Ala Asn Gly Ala Thr
      285      290      295

acc cgt tcc ctg gtt atg cgc gca aag tca ggc acc atc cgc cac atc 963
Thr Arg Ser Leu Val Met Arg Ala Lys Ser Gly Thr Ile Arg His Ile
      300      305      310

gag tct gtc cac cag ctg tcc aag ctg cag gaa tac tcc gtg gtt gac 1011
Glu Ser Val His Gln Leu Ser Lys Leu Gln Glu Tyr Ser Val Val Asp
      315      320      325      330

tac acc acc gcg acc taa gagctcttag ttcgaaaaac cgccggccat 1059
Tyr Thr Thr Ala Thr *
      335

tgtggtcggc g 1070

<210> 2
<211> 335
<212> PRT
<213> Corynebacterium glutamicum

```

<400> 2  
 Met Asn Leu Lys Asn Pro Glu Thr Pro Asp Arg Asn Leu Ala Met Glu  
 1 5 10 15  
 Leu Val Arg Val Thr Glu Ala Ala Leu Ala Ser Gly Arg Trp Val  
 20 25 30  
 Gly Arg Gly Met Lys Asn Glu Gly Asp Gly Ala Ala Val Asp Ala Met  
 35 40 45  
 Arg Gln Leu Ile Asn Ser Val Thr Met Lys Gly Val Val Val Ile Gly  
 50 55 60  
 Glu Gly Glu Lys Asp Glu Ala Pro Met Leu Tyr Asn Gly Glu Glu Val  
 65 70 75 80  
 Gly Thr Gly Phe Gly Pro Glu Val Asp Ile Ala Val Asp Pro Val Asp  
 85 90 95  
 Gly Thr Thr Leu Met Ala Glu Gly Arg Pro Asn Ala Ile Ser Ile Leu  
 100 105 110  
 Ala Ala Ala Glu Arg Gly Thr Met Tyr Asp Pro Ser Ser Val Phe Tyr  
 115 120 125  
 Met Lys Lys Ile Ala Val Gly Pro Glu Ala Ala Gly Lys Ile Asp Ile  
 130 135 140  
 Glu Ala Pro Val Ala His Asn Ile Asn Ala Val Ala Lys Ser Lys Gly  
 145 150 155 160  
 Ile Asn Pro Ser Asp Val Thr Val Val Val Leu Asp Arg Pro Arg His  
 165 170 175  
 Ile Glu Leu Ile Ala Asp Ile Arg Arg Ala Gly Ala Lys Val Arg Leu  
 180 185 190  
 Ile Ser Asp Gly Asp Val Ala Gly Ala Val Ala Ala Ala Gln Asp Ser  
 195 200 205  
 Asn Ser Val Asp Ile Met Met Gly Thr Gly Gly Thr Pro Glu Gly Ile  
 210 215 220  
 Ile Thr Ala Cys Ala Met Lys Cys Met Gly Gly Glu Ile Gln Gly Ile  
 225 230 235 240  
 Leu Ala Pro Met Asn Asp Phe Glu Arg Gln Lys Ala His Asp Ala Gly  
 245 250 255  
 Leu Val Leu Asp Gln Val Leu His Thr Asn Asp Leu Val Ser Ser Asp  
 260 265 270  
 Asn Cys Tyr Phe Val Ala Thr Gly Val Thr Asn Gly Asp Met Leu Arg  
 275 280 285  
 Gly Val Ser Tyr Arg Ala Asn Gly Ala Thr Thr Arg Ser Leu Val Met  
 290 295 300  
 Arg Ala Lys Ser Gly Thr Ile Arg His Ile Glu Ser Val His Gln Leu  
 305 310 315 320  
 Ser Lys Leu Gln Glu Tyr Ser Val Val Asp Tyr Thr Thr Ala Thr  
 325 330 335

<210> 3

<211> 35

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic construct

<400> 3

gagagagaga cgcgtcccag tggctgagac gcac

35

<210> 4

<211> 34

<212> DNA

<213> Artificial Sequence

&lt;220&gt;

&lt;223&gt; Synthetic construct

&lt;400&gt; 4

ctctctctgt cgacgaattc aatcttacgg cctg

34

&lt;210&gt; 5

&lt;211&gt; 4323

&lt;212&gt; DNA

&lt;213&gt; Corynebacterium glutamicum

&lt;400&gt; 5

tcgagaggcc tgacgtcggg cccgggtacca cgcgtcatat gactagttcg gacctaggga 60  
 tatcgtcgac atcgatgctc ttctgcgtta attaacaatt gggatcctct agaccgaggga 120  
 tttaaatcgc tagcgggctg ctaaaggaag cggaacacgt agaaagccag tccgcagaaa 180  
 cgggtgctgac cccggatgaa tgtcagctac tgggctatct ggacaaggga aaacgcgaagc 240  
 gcaaagagaa agcaggtagc ttgcagtggg cttacatggc gatagctaga ctgggcggtt 300  
 ttatggacag caagcgaacc ggaattgcca gctggggcgc cctctggtaa gggtgggaag 360  
 cctgcaaaag taaactggat ggctttcttg ccgccaagga tctgatggcg caggggatca 420  
 agatctgatc aagagacagg atgaggatcg tttcgcata ttgaacaaga tggattgcac 480  
 gcaggttctc cggccgcttg ggtggagagg ctattcggct atgactgggc acaacagaca 540  
 atcggctgct ctgatgccgc cgtgttccgg ctgtcagcgc aggggcgccc gggtcttttt 600  
 gtcaagaccg acctgtccgg tgcctgaat gaactgcagg acgaggcagc gcggctatcg 660  
 tggctggcca cgacgggcgt tccttgcgca gctgtgctcg acgttgtcac tgaagcggga 720  
 agggactggc tgctattggg cgaagtgcg gggcaggatc tcctgtcacc tcaccttgct 780  
 cctgccgaga aagtatccat catggctgat gcaatgcggc ggctgcatac gcttgatccg 840  
 gctacctgcc cattcgacca ccaagcgaag catcgcacg agcagacacg tactcggatg 900  
 gaagccggtc ttgtcgatca ggatgatctg gacgaagagc atcaggggct cgcgccagcc 960  
 gaactgttcg ccaggctcaa ggcgcgcacg cccgacggcg aggatctcgt cgtgacccat 1020  
 ggcgatgcct gcttgccgaa tatcatggtg gaaaatggcc gcttttcttg attcatcgac 1080  
 tgtggccggc tgggtgtggc ggaccgctat caggacatag cgttggttac ccgtgatatt 1140  
 gctgaagagc ttggcggcga atgggctgac cgcttcctcg tgctttaagg tatcgccgct 1200  
 cccgattcgc agcgcatacg cttctatcgc cttcttgacg agttcttctg agcgggactc 1260  
 tggggttcga aatgacagc caagcgagc ccaacctgcc atcacgagat ttcgattcca 1320  
 ccgcgcctt ctatgaaagg ttgggcttcg gaatcgtttt ccgggacgcc ggctggatga 1380  
 tcctccagcg cggggatctc atgctggagt tcttcgccc cgcctagcgg gcgcggcgcc 1440  
 gcccggtgtg aaataccgca cagatgcgta aggagaaaat accgcacag gcgctcttc 1500  
 gcttcctcgc tcaactgact gctgcgctcg gtcgttcggc tgcggcgagc ggtatcagct 1560  
 cactcaaagg cggtaatacg gttatccaca gaatcagggg ataacgcagg aaagaacatg 1620  
 tgagcaaaag gccagcaaaa ggccaggaac cgtaaaaagg ccgcgttgct gggttttttc 1680  
 cataggctcc gccccctga cgagcatcac aaaaatcgac gctcaagtca gaggtggcga 1740  
 aaccgcagag gactataaag ataccaggcg tttccccctg gaagctccct cgtgcgctct 1800  
 cctgttccga cctgcccgt taccggatac ctgtccgctt ttctcccttc gggaagcgtg 1860  
 gcgctttctc atagctcacg ctgtagggtat ctcagttcgg tgtaggctcg tcgctccaag 1920  
 ctgggctgtg tgcacgaacc ccccgttcag cccgaccgct gcgccttatc cggtaactat 1980  
 cgtcttgagt ccaaccgggt aagacacgac ttatcgccac tggcagcagc cactggtaac 2040  
 aggattagca gagcgaggta tgtaggcggg gctacagagt tcttgaagtg gtggcctaac 2100  
 tacggctaca ctagaaggac agtatttggt atctgcgctc tgctgaagcc agttaccttc 2160  
 ggaaaaagag ttggtagctc ttgatccggc aaacaaacca ccgctggtag cgggtggttt 2220  
 tttgtttgca agcagcagat tacgcgcaga aaaaaaggat ctcaagaaga tcctttgatc 2280  
 tttttacagg ggtctgacgc tcagtggaa gaaaactcac gttaagggat tttggctatg 2340  
 agattatcaa aaaggtctt caccatagac cttttaaagg ccggccgagg ccgcatcag 2400  
 cattttcttt tgcgttttta tttgttaact gttaattgtc cttgttcaag gatgctgtct 2460  
 ttgacaacag atgtttttct gcctttgatg ttcagcagga agctcggcgc aaacgttgat 2520  
 tgttttgtct cgtagaatcc tctgtttgtc atatagcttg taatcacgac attgtttcct 2580  
 ttcgcttgag gtacagcgaa gtgtgagtaa gtaaagggtta catcgtagg atcaagatcc 2640  
 atttttaaca caaggccagt tttgttcagc ggcttgtagg ggccagttaa agaattagaa 2700  
 acataaccaa gcatgtaaat atcgtaggac gtaatgccgt caatcgatc ttttgatccg 2760  
 cgggagtcag tgaacaggta ccatttgccg ttcattttta agacgttcgc gcgttcaatt 2820

tcattctgtta	ctgtgttaga	tgcaatcagc	ggtttcatca	cttttttcag	tgtgtaatca	2880
tcgttttagct	caatcatacc	gagagcgccg	tttgctaact	cagccgtgcg	ttttttatcg	2940
ctttgcagaa	gtttttgact	ttcttgacgg	aagaatgatg	tgcttttgcc	atagtatgct	3000
ttgttaaata	aagattcttc	gccttggttag	ccatcttcag	ttccagtgtt	tgcttcaaat	3060
actaagtatt	tgtggccttt	atcttctacg	tagtgaggat	ctctcagcgt	atgggtgtcg	3120
cctgagctgt	agttgccttc	atcgatgaac	tgctgtacat	tttgatacgt	ttttccgtca	3180
ccgtcaaaga	ttgatttata	atcctctaca	ccgttgatgt	tcaaagagct	gtctgatgct	3240
gatacgttaa	cttgtgcagt	tgtcagtggt	tgtttgccgt	aatgtttacc	ggagaaatca	3300
gtgtagaata	aacggatttt	tccgtcagat	gtaaatgtgg	ctgaacctga	ccattcttgt	3360
gtttggtctt	ttaggataga	atcatttgca	togaatttgt	cgctgtcttt	aaagacgcgg	3420
ccagcgtttt	tccagctgtc	aatagaagtt	tgcgcgactt	tttgatagaa	catgtaaatc	3480
gatgtgtcat	ccgcattttt	aggatctccg	gctaattgcaa	agacgatgtg	gtagccgtga	3540
tagtttgcca	cagtgccgtc	agcgttttgt	aatggccagc	tgtcccaaac	gtccaggcct	3600
tttgcagaag	agatatTTTT	aatgtgtggac	gaatcaaatt	cagaaacttg	atattttttca	3660
tttttttgct	gttcagggat	ttgcagcata	tcatggcggtg	taatatggga	aatgccgtat	3720
gtttccttat	atggcttttg	gttcgtttct	ttcgcaaacg	cttgagttgc	gcctcctgcc	3780
agcagtcggg	tagtaaagggt	taatactggt	gcttggtttg	caaacttttt	gatgttcate	3840
gttcattgtc	ccttttttat	gtactgtgtt	agcggctctgc	ttcttccagc	cctcctgttt	3900
gaagatggca	agttagttac	gcacaataaa	aaaagaccta	aaatatgtaa	ggggtgacgc	3960
caaagtatac	actttgccct	ttacacattt	taggtcttgc	ctgctttatc	agtaacaaac	4020
ccgcgcgatt	tacttttcga	cctcattcta	ttagactctc	gtttggattg	caactgggtc	4080
attttcctct	tttgtttgat	agaaaatcat	aaaaggattt	gcagactacg	ggcctaaaga	4140
actaaaaaat	ctatctgttt	cttttcatte	tctgtatttt	ttatagtttc	tgttgcatgg	4200
gcataaagtt	gccttttttaa	tcacaattca	gaaaatatca	taatatctca	tttactaaa	4260
taatagtga	cggcagggat	atgtgatggg	ttaaaaagga	tcggcggccg	ctcgatttaa	4320
atc						4323

&lt;210&gt; 6

&lt;211&gt; 5860.

&lt;212&gt; DNA

<213> *Corynebacterium glutamicum*

&lt;400&gt; 6

cccggtagca	cgcgctccag	tggctgagac	gcacccgcta	aagccccagg	aaccctgtgc	60
agaaagaaaa	cactcctctg	gctaggtaga	cacagtttat	aaaggtagag	ttgagcgggt	120
aactgtcagc	acgtagatcg	aaagggtcac	aaagggtggc	ctggctgtac	agaaatatgg	180
cggttcctcg	cttgagagtg	cggaacgcac	tagaaacgtc	gctgaacgga	tcgttgccac	240
caagaaggct	ggaaatgatg	tcgtgggtgt	ctgctccgca	atgggagaca	ccacggatga	300
acttctagaa	cttgcagcgg	cagtgaatcc	cgttccgcca	gctcgtgaaa	tggatatgct	360
cctgactgct	ggtagagcga	tttctaacgc	tctcgtcgcc	atggctattg	agtcctttgg	420
cgcagaagcc	caatctttca	cgggctctca	ggctgggtgtg	ctcaccaccg	agcgccacgg	480
aaacgcagcg	attgttgatg	tacttccagg	tcgtgtgcgt	gaagcactcg	atgagggcaa	540
gatctgcatt	gttgcgtggt	tccagggtgt	taataaagaa	accgcgcgatg	tcaccacgtt	600
gggtcgtggt	ggttctgaca	ccactgcagt	tgcgttggca	gctgctttga	acgtctatgt	660
gtgtgagatt	tactcggacg	ttgacggtgt	gtataccgct	gacccgcgca	tcgttccata	720
tgcacagaag	ctggaaaagc	tcagcttcga	agaaatgctg	gaacttgctg	ctgttggtct	780
caagattttg	gtgctgcgca	gtgttgaaata	cgctcgtgca	ttcaatgtgc	cacttcgcgt	840
acgctcgtct	tatagtaatg	atcccggcac	tttgattgcc	ggctctatgg	aggatattcc	900
tgtggaagaa	gcagtcctta	ccggtgtcgc	aaccgacaag	tccgaagcca	aagtaaccgt	960
tctgggtatt	tccgataagc	caggcgaggg	tgcgaagggt	ttccgtgcgt	tggctgatgc	1020
agaaatcaac	attgacatgg	ttctgcagaa	cgtctcttct	gtagaagacg	gcaccaccga	1080
catcaccttc	acctgccttc	gttccgacgg	ccgcgcgcgc	atggagatct	tgaagaagct	1140
tcaggttcag	ggcaactgga	ccaatgtgct	ttacgcagac	caggctcgga	aagttccctc	1200
cgtgggtgct	ggcatgaagt	ctcaccacgg	tgttaccgca	gagttcatgg	aagctctgcg	1260
cgatgtcaac	gtgaacatcg	aattgatttc	cacctctgag	attcgtattt	ccgtgctgat	1320
ccgtgaagat	gatctggatg	ctgctgcacg	tgcattgcat	gagcagttcc	agctgggcgg	1380
cgaagacgaa	gccgtcgttt	atgcaggcac	cggacgcata	agtttttaaag	gagtagtttt	1440
acaatgacca	ccatgcagat	tgttggtgca	accggccagg	tcggccagggt	tatgcgcacc	1500
cttttggaag	agcgcaattt	cccagctgac	actgttcggt	tctttgcttc	cccacgttcc	1560
gcaggccgta	agattgaatt	cgtcgacatc	gatgctcttc	tgcgttaatt	aacaattggg	1620
atcctctaga	cccgggattt	aaatcgctag	cgggctgcta	aaggaagcgg	aacacgtaga	1680

aagccagtcc	gcagaaacgg	tgctgacccc	ggatgaatgt	cagctactgg	gctatctgga	1740
caagggaaaa	cgcaagcgca	aagagaaagc	aggtagcttg	cagtgggctt	acatggcgat	1800
agctagactg	ggcgggttta	tggacagcaa	gcgaaccgga	attgccagct	ggggcgccct	1860
ctggttaaggt	tgggaagccc	tgcaaagtaa	actggatggc	tttcttgccg	ccaaggatct	1920
gatggcgag	gggatcaaga	tctgatcaag	agacaggatg	aggatcgttt	cgcatgattg	1980
aacaagatgg	attgcacgca	ggttctccgg	ccgcttgggg	ggagaggcta	ttcggctatg	2040
actgggcaca	acagacaatc	ggctgctctg	atgccggcgt	gttccggctg	tcagcgcagg	2100
ggcgcccggt	tctttttgtc	aagaccgacc	tgtccgggtg	cctgaatgaa	ctgcaggacg	2160
agcgacgag	gctatcgtgg	ctggccacga	cgggcgttcc	ttgcgcagct	gtgctcgacg	2220
ttgtcactga	agcgggaaag	gactggctgc	tattgggcga	agtgcggggg	caggatctcc	2280
tgtcatctca	ccttgctcct	gccgagaaag	tatccatcat	ggctgatgca	atgcggcggc	2340
tgcatacget	tgatccggct	acctgcccac	tcgaccacca	agcgaacat	cgcatcgagc	2400
gagcacgtac	tcggatggaa	gccggtcttg	tcgatcagga	tgatctggac	gaagagcatc	2460
aggggctcgc	gccagccgaa	ctgttcgcca	ggctcaaggc	gcgcatgccc	gacggcgagg	2520
atctcgtcgt	gacccatggc	gatgcctgct	tgccgaatat	catggtggaa	aatggccgct	2580
tttctggatt	catcgactgt	ggccggctgg	gtgtggcgga	ccgctatcag	gacatagcgt	2640
tggctacccg	tgatattgct	gaagagcttg	gcggcgcaatg	ggctgaccgc	ttcctcgtgc	2700
tttacgggtat	cgccgctccc	gattcgcagc	gcctcgcctt	ctatcgcctt	cttgaccagt	2760
tcttctgaag	gggtcgaaat	gaccgaccaa	gcgacgcccc	gcgacgcccc	acctgccatc	2820
acgagatttc	gattccaccg	ccgccttcta	tgaaagggtt	ggcttcggaa	tcgttttccg	2880
ggacgcgggc	tggtatgatcc	tccagcgccg	ggatctcatg	ctggagtctt	tcgcccacgc	2940
tagcggcgcg	ccggccggcc	cggtgtgaaa	taccgcacag	atgcgtaagg	agaaaatacc	3000
gcatcaggcg	ctcttcgctc	tcctcgctca	ctgactcgct	gcgctcggtc	gttcggctgc	3060
ggcgagcggt	atcagctcac	tcaaaggcgg	taatacgggt	atccacagaa	tcaggggata	3120
acgcaggaaa	gaacatgtga	gcaaaaaggcc	agcaaaaagg	caggaaccgt	aaaaaggccg	3180
cgttgctggc	gtttttccat	aggctccgcc	cccctgacga	gcatacaaaa	aatcgacgct	3240
caagtacag	gtggcgaaac	ccgacaggac	tataaagata	ccaggcggtt	ccccctggaa	3300
gctccctcgt	gcgctctcct	gttccgaccc	tgcgccttac	cggatacctg	tcgccttttc	3360
tcccttcggg	aagcgtggcg	ctttctcata	gctcacgctg	taggtatctc	agttcgggtg	3420
aggctcgttc	ctccaagctg	ggctgtgtgc	acgaaccccc	cgttcagccc	gaccgctgcg	3480
ccttatcccg	taactatcgt	cttgagtcca	acccggtaag	acacgactta	tcgccactgg	3540
cagcagccac	tggtaacagg	attagcagag	cgaggatagt	aggcggtgct	acagagttct	3600
tgaagtgggt	gcctaactac	ggctacacta	gaaggacagt	atttggtatc	tcgcgtctgc	3660
tgaagccagt	taccttcgga	aaaagagttg	gtagctcttg	atccggcaaa	caaaccaccg	3720
ctggttagcgg	tgggtttttt	gtttgcaagc	agcagattac	gcgcagaaaa	aaaggatctc	3780
aagaagatcc	tttgatcttt	tctacggggt	ctgacgtcca	gtggaacgaa	aactcacgtt	3840
aagggatttt	ggatcatgaga	ttatcaaaaa	ggatcttcac	ctagatcctt	ttaaaggccg	3900
gccgcggccg	ccatcggcat	tttcttttgc	gtttttatct	gttaactgtt	aattgtcctt	3960
gttcaaggat	gctgtctttg	acaacagatg	ttttcttgcc	tttgatgttc	agcagggaag	4020
tcggcgcaaa	cgttgattgt	ttgtctgcgt	agaatcctct	gtttgtcata	tagcttgtaa	4080
tcacgacatt	gtttcctttc	gcttgaggta	cagcgaagtg	tgagtaagta	aagggtacat	4140
cgttaggatc	aagatccatt	tttaacacaa	ggccagtttt	gttcagcggc	ttgtatgggc	4200
cagttaaaga	attagaaaca	taaccaagca	tgtaaatatc	gttagacgta	atgccgtcaa	4260
tcgtcatttt	tgatccgcgg	gagtcagtga	acaggtacca	tttgccgttc	attttaaaga	4320
cgttcgcgcg	ttcaatttca	tctgttactg	tggttagatg	aatcagcggt	ttcatcactt	4380
ttttcagtg	gtaatcatcg	tttagctcaa	tcataccgag	agcgcggttt	gctaactcag	4440
ccgtgcgttt	tttatcgctt	tcgagaagtt	tttgactttc	ttgacggaag	aatgatgtgc	4500
ttttgccata	gtatgctttg	ttaaataaag	attcttcgcc	ttggtagcca	tcttcagttc	4560
cagtgtttgc	ttcaaatact	aagtatttgt	ggcctttatc	ttctacgtag	tgaggatctc	4620
tcagcgtatg	gttgctcgct	gagctgtagt	tgccctcatc	gatgaactgc	tgtacatttt	4680
gatacgtttt	tccgtcaccg	tcaaagattg	atttataatc	ctctacaccg	ttgatgttca	4740
aagagctgct	tgatgctgat	acgttaactt	gtgcagttgt	cagtgtttgt	ttgccgtaat	4800
gtttaccgga	gaaatcagtg	tagaataaac	ggatttttcc	gtcagatgta	aatgtggctg	4860
aacctgacca	ttcttgtgtt	tggcttttta	gagtagaatc	atttgcacg	aatttgtcgc	4920
tgtcttttaa	gacgcggcca	gcgtttttcc	agctgtcaat	agaagtttcg	ccgacttttt	4980
gatagaacat	gtaaatcgat	gtgtcatccg	catttttagg	atctccggct	aatgcaaaga	5040
cgatgtggta	gccgtgatag	tttgcgacag	tgccgtcagc	gttttgtaat	ggccagctgt	5100
cccaaacgtc	caggcctttt	gcagaagaga	tatttttaat	tgtggacgaa	tcaaattcag	5160
aaacttgata	tttttcattt	ttttgctgtt	cagggatttg	cagcatatca	tggcgtgtaa	5220
tatgggaaat	gccgtatgtt	tccttatatg	gcttttgggt	cgtttcttcc	gcaaaccgct	5280
gagttgcgcc	tcctgccagc	agtgcggtag	taaaggttaa	tactgttgct	tgttttgcaa	5340

```

actttttgat gtccatcggt catgtctcct tttttatgta ctgtggttagc ggtctgcttc 5400
ttccagccct cctgtttgaa gatggcaagt tagttacgca caataaaaaa agacctaaaa 5460
tatgtaaggg gtgacgccaa agtatacact ttgcccttta cacatttttag gtcttgccctg 5520
ctttatcagt aacaaacccg cgcgatttac ttttcgacct cattctatta gactctcggt 5580
tggattgcaa ctggtctatt ttcctctttt gtttgataga aaatcataaa aggatttgca 5640
gactacgggc ctaaagaact aaaaaatcta tctgtttctt ttcattctct gtatttttta 5700
tagtttctgt tgcattggga taaagtggcc tttttaatca caattcagaa aatatcataa 5760
tatctcattt cactaaataa tagtgaacgg caggtatatg tgatggggtta aaaaggatcg 5820
gcgcccgctc gatttaaatc tcgagaggcc tgacgtcggg 5860

```

&lt;210&gt; 7

&lt;211&gt; 38

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Synthetic construct

&lt;400&gt; 7

cggcaccacc gacatcatct tcacctgccc tcgttccg

38

&lt;210&gt; 8

&lt;211&gt; 38

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Synthetic construct

&lt;400&gt; 8

cggaacgagg gcaggatgaag atgatgtcgg tgggtgccg

38

&lt;210&gt; 9

&lt;211&gt; 1263

&lt;212&gt; DNA

&lt;213&gt; Corynebacterium glutamicum

&lt;400&gt; 9

```

gtggccctgg tcgtacagaa atatggcggg tcctcgcttg agagtgcgga acgcattaga 60
aacgtcgctg aacggatcgt tgccaccaag aaggctggaa atgatgtcgt ggttgtctgc 120
tcgcgaatgg gagacaccac ggatgaactt ctagaacttg cagcggcagt gaatcccgtt 180
ccgccagctc gtgaaatgga tatgctcctg actgctgggt agcgtatttc taacgctctc 240
gtcgccatgg ctattgagtc ccttggcgca gaagcccaat ctttcacggg ctctcaggct 300
ggtgtgctca ccaccgagcg ccacggaaac gcacgcattg ttgatgtcac tccaggctcg 360
gtgctggaag cactcgatga gggcaagatc tgcattgttg ctggtttcca ggggtgtaat 420
aaagaaaccc gcgatgtcac cacgttgggt cgtggtggtt ctgacaccac tgcagttgcg 480
ttggcagctg ctttgaacgc tgatgtgtgt gagatttact cggacgttga cgggtgtgat 540
accgctgacc cgcgcacgtt tcctaattga cagaagctgg aaaagctcag cttcgaagaa 600
atgctggaac ttgctgctgt tggctccaag attttgggtg tgcgcagtgt tgaatacgtc 660
cgtgcattca atgtgccact tcgcgtacgc tcgtcttata gtaatgatcc cggcactttg 720
attgccggct ctatggagga tattcctgtg gaagaagcag tccttaccgg tgcgcaacc 780
gacaagtccg aagccaaagt aaccgttctg ggtatttccg ataagccagg cgaggctgcg 840
aaggttttcc gtgcgttggc tgatgcagaa atcaacattg acatggttct gcagaacgtc 900
tcttctgtag aagacggcac caccgacatc accttcacct gccctcgctc cgacggccgc 960
cgcgcgatgg agatcttgaa gaagcttcag gttcagggca actggacca tgtgctttac 1020
gacgaccagg tcggcaaaagt ctccctcggt ggtgctggca tgaagtctca cccagggtgt 1080
accgcagagt tcatggaagc tctgcgcgat gtcaacgtga acatcgaatt gatttccacc 1140
tctgagatgc gtatttccgt gctgatccgt gaagatgatc tggatgctgc tgcacgtgca 1200
ttgcatgagc agttccagct gggcggcgaa gacgaagccg tcgtttatgc aggcaccgga 1260

```

cgc

1263

&lt;210&gt; 10

&lt;211&gt; 5860

&lt;212&gt; DNA

<213> *Corynebacterium glutamicum*

&lt;400&gt; 10

```

cccgggtacca cgcgtcccag tggctgagac gcatccgcta aagccccagg aacctgtgtgc 60
agaaagaaaa cactcctctg gctaggtaga cacagtttat aaaggtagag ttgagcgggt 120
aactgtcagc acgtagatcg aaaggtgcac aaaggtggcc ctggctcgta agaaatatgg 180
cggttcctcg cttgagagtg cggaaacgat tagaaacgtc gctgaacgga tcgttgccac 240
caagaaggct ggaaatgatg tcgtgggtgt ctgctccgca atgggagaca ccacggatga 300
acttctagaa cttgcagcgg cagtgaatcc cgttccgcca gctcgtgaaa tggatatgct 360
cctgactgct ggtgagcgtg tttctaacgc tctcgtcgcc atggctattg agtcccttgg 420
cgcagaagcc caatctttca cgggctctca ggctggtgtg ctcaccaccg agcgccacgg 480
aaacgcacgc attgttgatg tcactccagg tcgtgtgctg gaagcactcg atgagggcaa 540
gatctgcatt gttgctggtt tccagggtgt taataaagaa acccgcgatg tcaccacgtt 600
gggtcgtggt ggttctgaca ccactgcagt tgcgttggca gctgctttga acgtgatgt 660
gtgtgagatt tactcggacg ttgacgggtg gtataccgct gacccgcgca tcgttcttaa 720
tgcacagaag ctggaaaagc tcagcttcga agaaatgctg gaacttgctg ctggttgctc 780
caagattttg gtgctgcgca gtgttgaaata cgtcgtgca ttcaatgtgc cacttcgctg 840
acgctcgtct tatagtaatg atcccggcac tttgattgcc ggctctatgg aggatatcc 900
tgtggaagaa gcagtcctta ccgggtgtcg aaccgacaag tccgaagcca aagtaaccgt 960
tctgggtatt tccgataagc caggcgaggc tgcgaagggt ttcgctgctg tggctgatgc 1020
agaaatcaac attgacatgg ttctgcagaa ccgcccgcg atggagatct tgaagaagct 1140
catcatcttc acctgccctc gttccgacgg ccgcccgcg atggagatct tgaagaagct 1140
tcaggttcag ggcaactgga ccaatgtgct ttacgacgac caggtcggca aagtcctcct 1200
cgtgggtgct ggcatagaat ctcaccacgg tgttacgca gagttcatgg aagctctgct 1260
cgatgtcaac gtgaacatcg aattgatttc cactctgag attcgtatct ccgtgctgat 1320
ccgtgaagat gatctggatg ctgctgcacg tgcattgcat gagcagttcc agctgggagg 1380
cgaagacgaa gccgtcgttt atgcaggcac cggacgctaa agttttaaag gagtagtttt 1440
acaatgacca ccatcgacgt tgttggtgca accggccagg tcggccagggt tatggcgacc 1500
cttttggaag agcgcaattt ccagctgac actgttcgtt tctttgcttc cccacgttcc 1560
gcaggccgta agattgaatt cgtcgacatc gatgctcttc tgcgttaatt aacaattggg 1620
atcctctaga cccgggattt aaatcgctag cgggctgcta aaggaagcgg aacacgtaga 1680
aagccagtc gcagaaacgg tgcagacccc ggatgaatgt cagctactgg gctatctgga 1740
caagggaaaa cgcaagcgca aagagaaagc aggtagcttg cagtgggctt acatggcgat 1800
agctagactg ggcggtttta tggacagcaa gcgaaccgga attgccagct ggggcgcctt 1860
ctggttaagg tgggaagccc tgcaaagtaa actggatggc tttcttgccg ccaaggatct 1920
gatggcgag gggatcaaga tctgatcaag agacaggatg aggatcggtt cgcattgatg 1980
aacaagatgg attgcacgca ggttctccgg ccgcttgggt ggagaggcta ttcggctatg 2040
actgggcaca acagacaatc ggctgctctg atgcccgtt gttccggctg tcagcgcagg 2100
ggcgcccggt tctttttgtc aagaccgacc tgcggtgct cctgaatgaa ctgcaggacg 2160
aggcagcgcg gctatcgtgg ctggccacga cgggcttcc ttgcgcagct gtgcagcag 2220
ttgtcactga agcgggaagg gactggctgc tattgggcca agtgccgggg caggatctcc 2280
tgtcatctca ccttgctcct gccgagaaag tatccatcat ggctgatgca atgcggcggc 2340
tgcatacgtc tgatccggct acctgcccac tcgaccacca agcgaaacat cgcacgagc 2400
gagcacgtac tcggatggaa gccggtcttg tcgacagga tgatctggac gaagagcatc 2460
aggggctcgc gccagccgaa ctgttcgcca ggctcaaggc gcgcatgccg gacggcgagg 2520
atctcgtcgt gacccatggc gatgctgct tgcgaatat catggtggaa aatggccgct 2580
tttctggatt catcgactgt ggccggctgg gtgtggcgga ccgctatcag gacatagcgt 2640
tggctaccgg tgatattgct gaagagcttg gcggcgaaat ggctgaccgc ttcctcgtgc 2700
tttacggtat cgcgctccc gattcgcagc gcacgcctt ctatgcctt cttgacgat 2760
tcttctgagc gggactctgg ggttcgaaat gaccgaccaa gcgacgcca acctgccatc 2820
acgagatttc gattccaccg ccgccttcta tgaaagggtg ggcttcggaa tcgttttccg 2880
ggacgcggcg tggatgatcc tccagcgcg ggatctcatg ctggagttct tcgcccacgc 2940
tagcggcgcg ccggccggcc cgggtgtgaa taccgcacag atgcgttaag agaaaatacc 3000
gcatcaggcg ctcttcgct tctcgtccta ctgactcgt gcgctcggtc gttcggctgc 3060
ggcgagcggg atcagctcac tcaaaggcgg taatacgggt atccacagaa tcaggggata 3120
acgcaggaaa gaacatgtga gcaaaaggcc agcaaaaggc caggaaccgt aaaaaggccc 3180

```



```

cgttgctggc gtttttccat aggctccgcc cccctgacga gcatacaaaa aatcgacgct 3240
caagtccagag gtggcgaaac ccgacaggac tataaagata ccaggcggtt cccctgggaa 3300
gctccctcgt gcgctctcct gttccgaccc tgccgcttac cggatacctg tccgcctttc 3360
tcccttcggg aagcgtggcg ctttctcata gctcacgctg taggtatctc agttcggtgt 3420
aggctcgttcg ctccaagctg ggctgtgtgc acgaaccccc cgttcagccc gaccgctgcg 3480
ccttatccgg taactatcgt cttgagtcca acccggttaag acacgactta tcgccactgg 3540
cagcagccac tggtaacagg attagcagag cgaggatgtg aggcggtgct acagagttct 3600
tgaagtgggt gcctaactac ggctacacta gaaggacagt atttggtatc tgcgctctgc 3660
tgaagccagt taccttcgga aaaagagttg gtagctcttg atccggcaaa caaacaccg 3720
ctggtagcgg tggttttttt gtttgcaagc agcagattac gcgcagaaaa aaaggatctc 3780
aagaagatcc tttgatcttt tctacggggt ctgacgctca gtggaacgaa aactcacgtt 3840
aagggatttt ggtcatgaga ttatcaaaaa ggatcttcac ctagatcctt ttaaaggccg 3900
gccgcggccg ccateggcat tttcttttgc gtttttattt gtttaactgtt aattgtcctt 3960
gttcaaggat gctgtctttg acaacagatg ttttcttgcc tttgatgttc agcaggaagc 4020
tcggcgcaaa cgttgattgt ttgtctgcgt agaactctct gttgtcata tagcttgtaa 4080
tcacgacatt gtttcctttc gcttgaggta cagcgaagtg tgagtaagta aaggttacat 4140
cgttaggatc aagatccatt ttaacacaa ggccagtttt gttcagcggc ttgtatggcg 4200
cagttaaaga attagaaaca taaccaagca tgtaaatac gtttagacgta atgccgtcaa 4260
tcgtcatttt tgatccgcgg gagtcagtga acaggtaacca tttgccgttc attttaaaga 4320
cgttcgcgcg ttcaatttca tctgttactg tgtagatgc aatcagcggg ttcactactt 4380
ttttcagtggt gtaatcatcg tttagctcaa tcataccgag agcgcggtt gctaactcag 4440
ccgtgcgttt tttatcgctt tgcagaagtt tttgactttc ttgacggaag aatgatgtgc 4500
ttttgccata gtatgctttg ttaaataaag attcttcgcc ttggtagcca tcttcagttc 4560
cagtggttgc ttcaaatac aagtatttgt ggcctttatc ttctacgtag tgaggatctc 4620
tcacggtatg gttgtcgct gagctgtagt tgccttcact gatgaactgc tgtacatttt 4680
gatacgtttt tccgtcaccc tcaaagattg atttataatc ctctacaccg ttgatgttca 4740
aagagctgtc tgatgctgat acgttaactt gtgcagttgt cagtgtttgt ttgccgtaat 4800
gtttaccgga gaaatcagtg tagaataaac ggatttttcc gtcagatgta aatgtggctg 4860
aacctgacca ttcttgtgtt tgggtctttt ggatagaatc atttgcatcg aatttgtcgc 4920
tgtctttaaa gacgcggcca gcgtttttcc agctgtcaat agaagtttcg ccgacttttt 4980
gatagaacat gtaaategat gtgtcatccg catttttagg atctccggt aatgcaaaga 5040
cgatgtggta gccgtgatag tttgcgacag tgccgtcagc gttttgtaat ggccagctgt 5100
cccaaacgtc caggcctttt gcagaagaga tatttttaat tgtggacgaa tcaaattcag 5160
aaacttgata tttttcattt ttttgcgtt cagggatttg cagcatatca tggcggtgaa 5220
tatgggaaat gccgtatgtt tccttatatg gcttttggtt cgtttctttc gcaaacgctt 5280
gagttgcgcc tcctgccagc agtgcggtag taaaggttaa tactgttgct tgttttgcaa 5340
actttttgat gttcatcggt catgtctcct tttttatgta ctgtgttagc ggtctgcttc 5400
ttccagccct cctgtttgaa gatggcaagt tagttacgca caataaaaaa agacctaaaa 5460
tatgtaaggg gtgacgcaa agtatacact ttgcccttta cacattttag gtcttgcttg 5520
ctttatcagt aacaaacccg cgcgatttac ttttcgacct cattctatta gactctcggt 5580
tggattgcaa ctggtctatt ttctctttt gtttgataga aaatcataaa aggatttgca 5640
gactacgggc ctaaaagaact aaaaaatcta tctgtttctt ttcattctct gtatttttta 5700
tagttttctgt tgcattgggca taaagttgcc tttttaatca caattcagaa aatatcataa 5760
tatctcattt cactaaataa tagtgaacgg caggtatatg tgatgggtta aaaaggatcg 5820
gcggccgctc gatttaaate tcgagaggcc tgacgtcggg 5860

```

<210> 11  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Synthetic construct

<400> 11  
 tggccgttac cctgcgaatg

20

<210> 12  
 <211> 20

<212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Synthetic construct  
 <400> 12  
 tgtatgtcct cctggacttc 20  
 <210> 13  
 <211> 40  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Synthetic construct  
 <400> 13  
 gaagtccagg aggacataca atgaacctaa agaacccccga 40  
 <210> 14  
 <211> 31  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Synthetic construct  
 <400> 14  
 atctacgtcg acccaggatg ccctggattt c 31  
 <210> 15  
 <211> 31  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Synthetic construct  
 <400> 15  
 tatcaacgcg ttcttcatcg gtagcagcac c 31  
 <210> 16  
 <211> 37  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Synthetic construct  
 <400> 16  
 cattcgcagg gtaacggcca ctgaagggcc tcctggg 37  
 <210> 17  
 <211> 5928  
 <212> DNA  
 <213> Corynebacterium glutamicum  
 <400> 17  
 tcgagaggcc tgacgtcggg cccggtacca cgcgttcttc atcggtagca gcacccgaga 60  
 ccatgacgcg ggcacgcgcc agatccatca cacgcagatc acgcacatca gattcctgtg 120

```

aggtgtaaat tcccacgtcg tggccatcaa gatcataaga ctcagaaaga tcacgccagc 180
gagtatcata accagccaca gcatcctcaa cggtttcacc agtttgagtg agctgaatat 240
agccctcatc tgcggtgaca tatccaacta cagatgccgg ggtgtcatcc accatgggtgc 300
gtcagagctga atttgtgggtc cagccttcag gagtttcagg caacctagtt gcatgatcag 360
tcattgcgcg cgcttccatt gacataaaaag tggaaagcatc aacttcaggt acctgccccat 420
tttcagggga tcctgtattg aaagaacaca ttcccgtaga tcccaccgct accaacatga 480
tgatcgcgga gactaccaac gagataatca tgtctcgact gccatcaaaa attttcggtc 540
gtttctcagc caccgccta gtatgtcacg agtttggtac gaaacccccct tttgggtgtc 600
cagaatccaa aattccgggc acaaaagtgc aacaatagat gacgtgcggg ttgatacagc 660
ccaagcgccg atacatttat aatgcgccta gatacgtgca acccacgtaa ccaggtcaga 720
tcaagtcccc caggaggccc ttcagtggcc gttaccctgc gaatgtccac agggtagctg 780
gtagtttgaa aatcaacgcc gttgccctta ggattcagta actggcacat tttgtaatgc 840
gctagatctg tgtgtcagc cttccagggt gcttatcaca gtgaaagcaa aaccaattcg 900
tggctgcgaa agtcgtagcc accacgaagt ccaggaggac atacaatgaa cctaaagaac 960
ccgaaacgc cagaccgtaa ccttgctatg gagctgggtg gagttacgga agcagctgca 1020
ctggcttctg gacgttgggt tggacgtggc atgaagaatg aaggcgacgg tgccgctggt 1080
gacgccatgc gccagctcat caactcagtg accatgaagg gcgtcggtgt tatcggcgag 1140
ggcgaaaaag acgaagctcc aatgctgtac aacggcgaag aggtcggaa cggctttgga 1200
cctgaggttg atatcgagtg tgaccaggtt gacggcacca ccctgatggc tgagggtcgc 1260
cccaacgcaa tttccattct cgcagctgca gagcgtggca ccatgtacga tccatcctcc 1320
gtcttctaca tgaagaagat cgccgtggga cctgaggccg caggcaagat cgacatcgaa 1380
gctccagttg ccacaacat caacgcgggtg gcaaagtcca agggaaatcaa cccttccgac 1440
gtcacccgtt tcgtgcttga ccgtcctcgc cacatcgaa c tgatcgcaga cattcgtcgt 1500
gcaggcgcaa aggttcgtct catctccgac ggcgacgttg caggtgcagt tgcagcagct 1560
caggattcca actccgtgga catcatgatg ggcaccggcg gaaccccaga aggcacatc 1620
actgcgtgcg ccataagtg catgggtggc gaaatccagg gcatcctggg tcgacatcga 1680
tgctcttctg cgttaattaa caattgggat cctctagacc cgggatttaa atcgtagcg 1740
ggctgctaaa ggaagcggaa cacgtagaaa gccagtccgc agaaacggtg ctgaccccg 1800
atgaatgtca gctactgggc tatctggaca agggaaaacg caagcgcaaa gagaaagcag 1860
gtagcttgca gtgggcttac atggcgatag ctagactggg cggttttatg gacagcaagc 1920
gaaccggaat tgccagctgg ggcgcctct ggtaagggtg ggaagccctg caaagtaaac 1980
tggatggctt tcttgccgcc aaggatctga tggcgaggg gatcaagatc tgatcaagag 2040
acaggatgag gatcgtttcg catgattgaa caagatggat tgcacgcagg ttctccggcc 2100
gcttgggtgg agaggtatt cggctatgac tgggcacaa agacaatcgg ctgctcgcat 2160
gcccgcgtgt tccggtgtc agcgcagggg gcgccggtt tttttgtcaa gaccgacctg 2220
tccggtgccc tgaatgaact gcaggacgag gcagcgcgcc tatcgtggct ggccacgacg 2280
ggcgcttctt gcgcagctgt gctcgacgtt gtcactgaag cgggaaggga ctggctgcta 2340
ttgggcgaag tgccggggca ggatctctct tcatctcacc ttgctcctgc cgagaaagta 2400
tccatcatgg ctgatgcaat gcggcggtc catagcgtt atccggctac ctgcccattc 2460
gaccaccaag cgaaacatcg catcgagcga gcacgtactc ggatggaagc cggctctgtc 2520
gatcaggatg atctggacga agagcatcag ggcctcgcgc cagccgaact gttcgccagg 2580
ctcaaggcgc gcatgcccga cggcgaggat ctgctcgtga cccatggcga tgcctgcttg 2640
ccgaatatca tgggtgaaaa tggcgcgttt tctggattca tcgactgtgg ccgctgggt 2700
gtggcgagcc gctatcagga catagcgttg gctaccctg atattgtgta agagcttggc 2760
ggcgaaatgg ctgaccgctt cctcgtgctt tacggtatcg ccgctcccga ttcgcagcgc 2820
atcgcttct atcgcttct tgacgagttc ttctgagcgg gactctgggg ttcgaaatga 2880
ccgaccaagc gacgcccac ctgccatcac gagatttcga ttccaccgcc gccttctatg 2940
aaaggttggg cttcggaatc gttttccggg acgcggctg gatgatcctc cagcgcgggg 3000
atctcatgct ggagttcttc gccacgcta gcggcgcgcc ggccggcccg gtgtgaaata 3060
ccgcacagat gcgtaaggag aaaataccgc atcaggcgct cttccgcttc ctgctcact 3120
gactcgctgc gctcggtcgt tcggctgcgg cgagcggtat cagctcactc aaaggcggta 3180
atacggttat ccacagaatc aggggataac gcaggaaaga acatgtgagc aaaaggccag 3240
caaaaggcca ggaaccgtaa aaaggccggt ttgctggcgt ttttccatag gctccgcccc 3300
cctgacgagc atcacaaaaa tcgacgtcga agtcagaggt ggcgaaaccc gacaggacta 3360
taaagatacc aggcgtttcc ccctggaagc tccctcgtgc gctctcctgt tccgacctg 3420
ccgcttaccg gatacctgtc cgcctttctc ctttcgggaa gcgtggcgct ttctcatagc 3480
tcacgctgta ggtatctcag ttcgggtgtag gtcgttcgct ccaagctggg ctgtgtgcac 3540
gaaccccccg ttcagcccga ccgctgcgcc ttatccggta actatcgtct tgagtccaac 3600
ccggaagac acgacttatc gccactggca gcagccactg gtaacaggat tagcagagcg 3660
aggtatgtag gcggtgctac agagttcttg aagtgggtgg ctaactacgg ctacactaga 3720
aggacagtat ttggtatctg cgctctgctg aagccagtta ccttcggaaa aagagttggg 3780

```

```

agctcttgat cccgcaaaaca aaccaccgct ggtagcgggtg gtttttttgt ttgcaagcag 3840
cagattacgc gcagaaaaaaa aggatctcaa gaagatcctt tgatcttttc tacggggtct 3900
gacgctcagt ggaacgaaaaa ctcacgttaa gggatttttg tcatgagatt atcaaaaagg 3960
atcttcacct agatcctttt aaaggccggc cgcggccgcc atcggcattt tcttttgct 4020
ttttatttgt taactgttaa ttgtccttgt tcaaggatgc tgtctttgac aacagatgtt 4080
ttcttgccct tgatgttcag caggaagctc ggcgcaaacg ttgattgttt gtctgcgtag 4140
aatcctctgt ttgtcatata gcttgaatc acgacattgt ttcctttcgc ttgagggtaca 4200
gcgaagtgtg agtaagttaa ggttacatcg ttaggatcaa gatccatttt taacacaagg 4260
ccagttttgt tcagcggctt gtatgggcca gttaaagaat tagaaacata accaagcatg 4320
taaataatcg tagacgtaat gccgtcaatc gtcatttttg atccgcggga gtcagtgaac 4380
aggtaccatt tgccgttcatt tttaaagacg ttccgcgctt caatttcacg tgttactgtg 4440
ttagatgcaa tcagcgggtt catcactttt ttcagtgtgt aatcatcggt tagctcaatc 4500
ataccgagag cgcctgtttg taactcagcc gtgcgttttt tatcgctttg cagaagtttt 4560
tgactttctt gacggaagaa tgatgtgctt ttgccatagt atgctttgtt aaataaagat 4620
tcttcgcctt ggtagccatc ttcagttcca gtgtttgtct caaatactaa gtatttgtgg 4680
cctttatctt ctacgtagtg aggatctctc agcgtatggt tgcgcctga gctgtagtgt 4740
ccttcacgta tgaactgctg tacattttga tacgtttttc cgtcaccgtc aaagattgat 4800
ttataatcct ctacaccgtt gatgttcaaa gagctgtctg atgctgatac gtttaactgt 4860
gcagttgtca gtgtttgttt gccgtaatgt ttaccggaga aatcagtgtg gaataaacgg 4920
atctttccgt cagatgtaaa tgtggctgaa cctgaccatt cttgtgtttg gtcttttagg 4980
atagaatcat ttgcatcgaa tttgtcgtg tctttaaaga cgcggccagc gtttttccag 5040
ctgtcaatag aagtttcgcc gactttttga tagaacatgt aaatcgatgt gtcacccgca 5100
tttttaggat ctccggctaa tgcaaagacg atgtggtagc cgtgatagtt tgcgacagtg 5160
ccgtcagcgt tttgtaatgg ccagctgtcc caaacgtcca ggccttttgc agaagagata 5220
ttttaatttg tggacgaatc aaattcagaa acttgatatt tttcattttt ttgctgttca 5280
gggattttga gcataatcat gcgtgtaata tgggaaatgc cgtatgtttc cttatatggc 5340
ttttggttcg tttctttcgc aaacgcttga gttgcgcctc ctgccagcag tgcggtagta 5400
aagggttaata ctgttgcttg ttttgcaaac tttttgatgt tcatcgttca tgtctccttt 5460
tttatgtact gtgttagcgg tctgtcttct ccagccctcc tgtttgaaga tggcaagtta 5520
gttacgcaca ataaaaaaag acctaaaata tgtaaggggt gacgccaaag tatacacttt 5580
gccctttaca catttttaggt cttgcctgct ttatcagtaa caaacccgcg cgatttactt 5640
ttcgacctca ttctattaga ctctcgtttg gattgcaact ggtctatatt cctcttttgt 5700
ttgatagaaa atcataaaaag gatttgcaga ctacgggcct aaagaactaa aaaatctatc 5760
tgtttctttt cattctctgt attttttata gtttctgttg catgggcata aagttgcctt 5820
tttaatcaca attcagaaaa tatcataata tctcatttca ctaaataata gtgaacggca 5880
ggtatatgtg atgggttaaa aaggatcggc ggccgctcga tttaaatc 5928

```

<210> 18  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> synthetic construct

<400> 18  
 tagctgccaa ttattccggg

20

<210> 19  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> synthetic construct

<400> 19  
 gggtaaaaaa tcctttcgtg

20

<210> 20  
 <211> 37  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> synthetic construct

<400> 20  
 cccggaataa ttggcagcta ctgaagggcc tcctggg 37

<210> 21  
 <211> 31  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> synthetic construct

<400> 21  
 tatcaacgcg ttcttcatcg gtagcagcac c 31

<210> 22  
 <211> 40  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> synthetic construct

<400> 22  
 tacgaaagga ttttttaccc atgaacctaa agaaccocga 40

<210> 23  
 <211> 31  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> synthetic construct

<400> 23  
 atctacgtcg acccaggatg ccctggattt c 31

<210> 24  
 <211> 5920  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> synthetic construct

<400> 24  
 cgcgttcttc atcggtagca gcacccgaga ccatgaocg ggcacgcgcc agatccatca 60  
 cacgcagatc acgcacatca gattcctgtg aggtgtaaat tcccacgtcg tggccatcaa 120  
 gatcataaga ctacagaaaga tcacgccagc gagtatcata accagccaca gcacccatcaa 180  
 cggtttcacc agtttgagtg agctgaatat agccctcatc tgcggtgaca tatccaaacta 240  
 cagatgcggg ggtgtcatcc accatgggtgc gtcgagctga atttgtgggc cagcccttcag 300  
 gagtttcggg caacctagtt gcatgatcag tcattgcgcg cgcttcatt gacataaaaag 360  
 tgggaagcat aacttcaggc acctgcccac tttcagggga tcctgtattg aaagaacaca 420  
 ttcccgtgaa tcccaccgct accaaccatga tgatcgcgga gactaccaac gagataatca 480

```

tgtctcgact gccatcaaaa attttcggtc gtttctcagc caccgccta gtatgtcacg 540
agtttggtac gaaacccct tttgggtgtc cagaatccaa aattccgggc acaaaagtgc 600
aacaatagat gacgtgcggg ttgatacagc ccaagcgccg atacatttat aatgcgccta 660
gatacgtgca acccacgtaa ccaggtcaga tcaagtcccc caggaggccc ttcagtagct 720
gccaatattt ccgggcttgt gaccgcctac ccgataaata ggtcggctga aaaatttcgt 780
tgcaatatca acaaaaaggc ctatcattgg gaggtgtcgc accaagtact tttgcgaagc 840
gccatctgac ggattttcaa aagatgtata tgctcgggtc ggaaacctac gaaaggattt 900
tttacctatg aacctaaaga acccgaaac gccagaccgt aaccttgcta tggagctggt 960
gcgagttacg gaagcagctg cactggcttc tggacgttgg gttggacgtg gcatgaagaa 1020
tgaaggcgac ggtgcgctg ttgacgccat gcgccagctc atcaactcag tgaccatgaa 1080
gggcgtcgtt gttatcggcg agggcgaaaa agacgaagct ccaatgctgt acaacggcga 1140
agaggtcgga accggctttg gacctgaggt tgatatcgca gttgaccag ttgacggcac 1200
caccctgatg gctgagggtc gcccacacgc aatttccatt ctgcgagctg cagagcgtgg 1260
caccatgtac gatccatcct cctcttcta catgaagaag atcgccgtgg gacctgaggg 1320
cgcaggcaag atcgacatcg aagctccagt tgcccacaac atcaacgcgg tggcaaagtc 1380
caagggaatc aaccttccg acgtcacctg tgctgtgctt gaccgtcctc gccacatcga 1440
actgatcgca gacattcgtc gtgcaggcgc aaaggttcgt ctcatctccg acggcgagct 1500
tgcaggtgca gttgcagcag ctacggattc caactccgtg gacatcatga tgggcaccgg 1560
cggaacccca gaaggcatca tcaactgcgtg cgccatgaag tgcattgggtg gcgaaatcca 1620
gggcacctcg ggtcgacatc gatgctcttc tgctttaatt aacaattggg atcctctaga 1680
cccgggattt aaatcgctag cgggctgcta aaggagcgg aacacgtaga aagccagtc 1740
gcagaaacgg tgctgacccc ggatgaatgt cagctactgg gctatctgga caagggaaaa 1800
cgcaagcgca aagagaaagc aggtagcttg cagtgggctt acatggcgat agctagactg 1860
ggcggtttta tggacagcaa gcgaaccgga attgccagct ggggcgcct ctggtaaagt 1920
tgggaagccc tgcaaagtaa actggatggc tttcttgccg ccaaggatct gatggcgag 1980
gggatcaaga tctgatcaag agacaggatg aggatcgctt cgcatgattg aacaagatgg 2040
attgcacgca ggttctccg cgccttgggt ggaaggcta ttcggctatg actgggcaca 2100
acagacaatc ggctgctctg atgccgctg gttccggctg tcagcgcagg ggcgcctggt 2160
tctttttgtc aagaccgacc tgcctgggtc cctgaatgaa ctgcaggac aggcagcgcg 2220
gctatcgtgg ctggccacga cggcgcttc ttgcgcagct gtgctcgac ttgtcactga 2280
agcgggaagg gactggctgc tattggcgca agtgccgggg caggatctcc tgtcatctca 2340
ccttgctcct gccgagaaag tatccatcat ggctgatgca atgcggcggc tgcatacgt 2400
tgatccggct acctgcccat tcgaccacca agcgaacat cgcacgagc gagcacgtac 2460
tcggatggaa gccggtcttg tcgatcagga tgatctggac gaagagcatc aggggctcgc 2520
gccagcgaa ctgttcgcca ggctcaaggc gcgcatgccc gacggcgagg atctcgtcgt 2580
gacccatggc gatgcctgct tgccgaatat catggtggaa aatggccgct tttctggatt 2640
catcgactgt ggccggctgg gtgtggcgga ccgctatcag gacatagcgt tggctaccg 2700
tgatattgct gaagagcttg gcggcgaatg ggctgaccgc ttcctcgtgc ttacggtat 2760
cgccgctccc gattcgcagc gcacgcctt ctatcgctt cttgacgagt tcttctgagc 2820
gggactctgg ggttcgaaat gaccgacca gcgacgccc acctgccatc acgagatttc 2880
gattccaccg ccgcttcta tgaaagggtt ggcttcggaa tcgttttcgg ggacgcggc 2940
tggatgatcc tccagcgcg ggatctcatg ctggagttct tcgcccacgc tagcggcgcg 3000
ccggccggcc cgggtgtgaa taccgcacag atgcgtaagg agaaaatacc gcatcaggcg 3060
ctcttcgct tctcgcctca ctgactcgct gcgctcggtc gttcggctgc ggcgagcgg 3120
atcagctcac tcaaaggcgg taatacgggt atccacagaa tcaggggata acgcaggaaa 3180
gaacatgtga gcaaaaggcc agcaaaaggc caggaaacct aaaaaggccg cgttgctggc 3240
gtttttccat aggtccgcc cccctgacga gcatacaaaa aatcgacgct caagtcagag 3300
gtggcgaaac ccgacaggac tataaagata ccaggcgttt cccctggaa gctccctcgt 3360
gcgctctcct gttccgacct tgccgcttac cggatacctg tccgcctttc tcccttcggg 3420
aagcgtggcg ctttctcata gctcacgctg taggtatctc agttcgggtg aggtcgttcg 3480
ctccaagctg ggctgtgtgc acgaaccccc cgttcagccc gaccgctcg cctatccgg 3540
taactatcgt cttgagtcga acccggtaa cgaggtagt agggcggtg acagagttct tgaagtggg 3600
tgctaacagg attagcagga gaaggacagt atttggtatc tgcgctctgc tgaagccagt 3720
gcctaactac ggctacacta aaaagagttg gtagctcttg atccggcaaa caaaccaccg ctggtagcgg 3780
taccttcgga aaagagttg agcagattac gcgcagaaaa aaaggatctc aagaagatcc 3840
tgggtttttt gtttgcaagc agcagattac gtggaacgaa aactcacgtt aagggatttt 3900
tttgatcttt tctacggggt ctgacgctca ctagatcctt ttaaaggccg gccgcggccg 3960
ggcatgaga ttatcaaaaa ggatcttcac gttaactggt aattgtcctt gttcaaggat 4020
ccatcggcat tttcttttgc gtttttattt tttgatgttc agcaggaagc tcggcgcaaa 4080
gctgtctttg acaacagatg ttttcttgcc tttgtgctata tagcttgtaa tcacgacatt 4140
cgttgattgt ttgtctgct agaatcctct gtttgcata

```

gtttcctttc	gcttgaggta	cagcgaagtg	tgagtaagta	aaggttacat	cgttaggatc	4200
aagatccatt	tttaacacaa	ggccagtttt	gttcagcggc	ttgtatgggc	cagttaaaga	4260
attagaaaca	taaccaagca	tgtaaataac	gttagacgta	atgccgtcaa	tcgtcatttt	4320
tgatccgcgg	gagtcagtga	acaggtacca	tttgccgttc	attttaaaga	cgttcgcgcg	4380
ttcaatttca	tctgttactg	tgttagatgc	aatcagcggg	ttcatcactt	ttttcagtg	4440
gtaatcatcg	tttagctcaa	tcataccgag	agcgcggttt	gctaactcag	ccgtgcggtt	4500
tttatcgctt	tcgagaagtt	tttgactttc	ttgacggaag	aatgatgtgc	ttttgccata	4560
gtatgctttg	ttaaataaag	attcttcgcc	ttggtagcca	tcttcagttc	cagtgtttgc	4620
ttcaataact	aagtatttgt	ggcctttatc	ttctacgtag	tgaggatctc	tcagcgtatg	4680
gttgctgcct	gagctgtagt	tgccctcatc	gatgaactgc	tgtacatttt	gatacgtttt	4740
tccgtcaccg	tcaaagattg	atttataatc	ctctacaccg	ttgatgttca	aagagctgtc	4800
tgatgctgat	acgttaactt	gtgcagttgt	cagtgtttgt	ttgccgtaat	gtttaccgga	4860
gaaatcagtg	tagaataaac	ggatttttcc	gtcagatgta	aatgtggctg	aacctgacca	4920
ttcttgtgtt	tggtctttta	ggatagaatc	atttgcacgc	aatttgtcgc	tgtcttttaa	4980
gacgcggcca	gcgtttttcc	agctgtcaat	agaagtttcg	ccgacttttt	gatagaacat	5040
gtaaatcgat	gtgtcatccg	catttttagg	atctccggct	aatgcaaaga	cgatgtggta	5100
gccgtgatag	tttgccgacg	tgccgtcagc	gttttgtaat	ggccagctgt	cccaaaccgc	5160
caggcccttt	gcagaagaga	tatttttaat	tgtggacgaa	tcaaattcag	aaacttgata	5220
tttttcattt	ttttgctgtt	cagggatttg	cagcatatca	tggcgtgtaa	tatgggaaat	5280
gccgtatgtt	tccttatatg	gcttttggtt	cgtttctttc	gcaaaccgct	gagttgcgcc	5340
tcctgccagc	agtgcggtag	taaaggttaa	tactgttgct	tgttttgcaa	actttttgat	5400
gttcatcggt	catgtctcct	tttttatgta	ctgtgttagc	ggtctgcttc	ttccagccct	5460
cctgtttgaa	gatggcaagt	tagttacgca	caataaaaaa	agacctaaaa	tatgtaaggg	5520
gtgacgcca	agtatacact	ttgcccttta	cacattttag	gtcttgccctg	ctttatcagt	5580
aacaaaccgg	cgcgatttac	ttttcgacct	cattctatta	gactctcggt	tggattgcaa	5640
ctgggtctatt	ttcctctttt	gtttgataga	aaatcataaa	aggatttgca	gactacgggc	5700
ctaaagaact	aaaaaatcta	tctgtttctt	ttcattctct	gtatttttta	tagtttctgt	5760
tgcattgggca	taaagttgcc	tttttaatac	caattcagaa	aatatcataa	tatctcattt	5820
cactaaataa	tagtgaacgg	caggtatatg	tgatgggtta	aaaaggatcg	gcggccgctc	5880
gattttaaatc	tcgagaggcc	tgacgtcggg	cccggtagca			5920

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☐ **BLACK BORDERS**

☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**

☐ **FADED TEXT OR DRAWING**

☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**

☐ **SKEWED/SLANTED IMAGES**

☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**

☐ **GRAY SCALE DOCUMENTS**

☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**

☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**

☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**